

Math0304 Chapter 7 Test 5

Find the domain,

Domain \equiv restrictions to x values

$$1) f(x) = \frac{x-3}{2x-8} \rightarrow \text{cannot be zero}$$

$$\begin{array}{r} 2x-8 = 0 \\ +8 \quad +8 \end{array}$$

$$\frac{2x}{2} = \frac{8}{2}$$

$$x = 4$$

$$D = \{x \neq 4\}$$

$$2) g(x) = \frac{2x}{x^2-4x+3} \rightarrow \text{cannot be zero}$$

$$x^2 - 4x + 3 = 0$$

$$\begin{array}{cc} (x-3) & (x-1) \\ \parallel & \parallel \\ 0 & 0 \end{array} = 0$$

$$x-3=0$$

$$x=3$$

$$x-1=0$$

$$x=1$$

$$D: \{x \neq 3, x \neq 1\}$$

Find the function value.

$$3) g(x) = \frac{x^2 + 1}{x - 2}$$

$$a) g(1) = \frac{(1)^2 + 1}{1 - 2} = \frac{1 + 1}{-1} = \frac{2}{-1} = \boxed{-2}$$

$$b) g(2) = \frac{(2)^2 + 1}{2 - 2} = \frac{4 + 1}{0} = \frac{5}{0} = \boxed{\text{und}}$$

$$c) g(0) = \frac{(0)^2 + 1}{0 - 2} = \boxed{\frac{1}{-2}}$$

Simplify. Factor the reduce.

$$4) \frac{5x - 15}{25x - 75} = \frac{\cancel{5}^1 (\cancel{x-3}^1)}{\cancel{25}^5 \cdot \cancel{(x-3)}^1} = \boxed{\frac{1}{5}}$$

$$5) \frac{2x^2 + 4x - 30}{x^2 + 1x - 20} = \frac{2(x^2 + 2x - 15)}{(x - 4)(x + 5)} \\ = \frac{2(\cancel{x+5})(x-3)}{(x-4)\cancel{(x+5)}} \\ \boxed{\frac{2(x-3)}{(x-4)}}$$

Find LCD

$$\textcircled{6} \quad \frac{17x}{4y^5}, \frac{2}{10y}$$

$$\begin{array}{l} 4y^5 = 2 \cdot 2 \cdot y \cdot y \cdot y \cdot y \cdot y \\ 10y = 2 \cdot 5 \cdot y \end{array}$$

$$\text{LCD} = 2 \cdot 2 \cdot 5 \cdot y \cdot y \cdot y \cdot y \cdot y = \boxed{20y^5}$$

$$\textcircled{7} \quad \frac{19x+5}{4x-12}, \frac{3}{x^2-3x}$$

$$\begin{array}{l} 4x-12 = 4 \cdot (x-3) \\ x^2-3x = x \cdot (x-3) \end{array}$$

$$\text{LCD} = 4 \cdot x \cdot (x-3) = \boxed{4x(x-3)}$$

8-15 Perform the indicated operations.

$$\textcircled{8} \quad \frac{5}{x-1} \cdot \frac{(4x-4)}{1} = \frac{5}{\cancel{(x-1)}} \cdot \frac{4\cancel{(x-1)}}{1} = \boxed{20}$$

$$\textcircled{9} \quad \frac{a^2-4a+4}{a^2-4} \div \frac{a-2}{a+3} = \frac{\cancel{(a-2)} \cdot \cancel{(a-2)}}{(a+2) \cdot \cancel{(a-2)}} \cdot \frac{(a+3)}{\cancel{(a-2)}} = \boxed{\frac{a+3}{a+2}}$$

Keep Flip Change

$$\begin{aligned}
 & \textcircled{10} \quad \frac{9x+18}{3x^2+x} \cdot \frac{3x^2+13x+4}{x^2-16} \\
 & \quad \frac{9(x+2)}{x(3x+1)} \cdot \frac{\cancel{(3x+1)} \cancel{(x+4)}}{\cancel{(x+4)}(x-4)} \\
 & \quad \boxed{\frac{9(x+2)}{x(x-4)}}
 \end{aligned}$$

$$\begin{aligned}
 & \textcircled{11} \quad \frac{5x}{x+2} - \frac{3x-4}{x+2} \quad (\text{subtraction}) \\
 & \quad \quad \quad \downarrow \\
 & \quad \quad \text{same denom.} \\
 & = \frac{5x - 1(3x-4)}{x+2} \\
 & = \frac{5x - 3x + 4}{x+2} \\
 & = \frac{2x + 4}{x+2} \\
 & = \frac{2(\cancel{x+2})}{(\cancel{x+2})} = \boxed{2}
 \end{aligned}$$

(12) $\frac{x+2}{x^2-5x} + \frac{4}{3x-15}$ Add \rightarrow Same denominator

$$\frac{3 \cdot (x+2)}{3 \cdot x(x-5)} + \frac{x \cdot 4}{x \cdot 3(x-5)} \quad \text{LCD} = 3x(x-5)$$

$$\frac{3x+6+4x}{3x(x-5)}$$

$$\boxed{\frac{7x+6}{3x(x-5)}}$$

(13) $\frac{5}{(x-4)} + \frac{4x}{x^2-16 = (x+4)(x-4)}$

$$\frac{(x+4)(5)}{(x+4)(x-4)} + \frac{4x}{(x+4)(x-4)} \quad \text{LCD} = (x+4)(x-4)$$

$$\frac{5x+20+4x}{(x+4)(x-4)} = \boxed{\frac{9x+20}{(x+4)(x-4)}}$$

Subtraction

$$\textcircled{14} \quad \frac{x}{x^2-4} - \frac{5}{x^2-4x+4}$$

$$\frac{(x-2)x}{(x-2)(x+2)(x-2)} + \frac{-5(x+2)}{(x-2)(x-2)(x+2)}$$

have $(x-2)(x+2)(x-2)$ $(x-2)(x-2)(x+2)$

LCD: $(x+2)(x-2)(x-2)$ Want

$$\frac{x^2 - 2x - 5x - 10}{(x-2)(x+2)(x-2)}$$

$$\frac{x^2 - 7x - 10}{(x-2)(x+2)(x-2)}$$

$$\textcircled{15} \quad \frac{x+4}{x^2+12x+20} + \frac{x+1}{x^2+8x-20}$$

$$\frac{x+4}{(x+2)(x+10)} + \frac{x+1}{(x+10)(x-2)}$$

$$\text{LCD: } (x+2)(x+10)(x-2)$$

$$\frac{(x+4)(x-2)}{(x+2)(x+10)(x-2)} + \frac{(x+1)(x+2)}{(x+10)(x-2)(x+2)}$$

$$\frac{\cancel{x} - 2x + 4x - 8 + \cancel{x^2} + 2x + 1x + 2}{(x+2)(x+10)(x-2)}$$

$$\boxed{\frac{2x^2 + 5x - 6}{(x+2)(x+10)(x-2)}}$$

16 Solve and check.

$$\cancel{x} \cdot \frac{5}{1} + \frac{4}{\cancel{x}} = \frac{1}{1} \cdot x \quad \text{LCD: } x$$

$$5x + \cancel{4} = x \quad -4$$

$$5x - x = \cancel{x} - 4$$

$$\frac{4x}{4} = \frac{-4}{4} = \boxed{-1} \checkmark$$

$$(17) \quad \frac{2a}{a+2} - \frac{5}{1} = \frac{7a}{a+2}$$

Step 1: LCD = $a+2$

Step 2: Multiply each term in both sides of EQ by $(a+2)$

$$\cancel{(a+2)} \cdot \frac{2a}{\cancel{(a+2)}} + \frac{-5}{1} (a+2) = \cancel{(a+2)} \cdot \frac{7a}{\cancel{(a+2)}}$$

$$2a - 5a - 10 = 7a$$

$$\begin{array}{r} -3a - 10 = 7a \\ +3a \qquad +3a \end{array}$$

$$\frac{-10}{10} = \frac{10a}{10}$$

$$\boxed{-1 = a}$$

$$\textcircled{18} \quad \frac{2y}{y-2} - \frac{4}{y-2} = 4$$

Step 1: LCD = $y-2$

Step 2: Multiply each term by $y-2$

$$\cancel{(y-2)} \cdot \frac{2y}{\cancel{(y-2)}} - \frac{4}{\cancel{(y-2)}} = \frac{4(y-2)}{1}$$

$$2y - 4 = 4y - 8$$

$$2y = 4y - 4$$

$$-2y = -4$$

$$y = 2$$

Step 3: Check $y=2$ $y \neq 2$

NO Solution

$$\textcircled{19} \quad \frac{3}{(x+3)} = \frac{12x+19}{x^2+7x+12} - \frac{5}{(x+4)}$$

$\xrightarrow{\quad (x+3) \quad (x+4) \quad}$

Step 1: Find LCD. $(x+3)(x+4)$

Step 2: Multiply each term by $(x+3)(x+4)$

$$\cancel{(x+3)} \cancel{(x+4)} \cdot \frac{3}{\cancel{(x+3)}} = \frac{(12x+19)}{\cancel{(x+3)} \cancel{(x+4)}} - \frac{5}{\cancel{(x+4)}} \cdot \cancel{(x+3)}$$

$$3x+12 = 12x+19-5x-15$$

$$\begin{array}{r} 3x+12 = 7x+4 \\ -3x \quad \quad -3x \end{array}$$

$$\begin{array}{r} 12 = 4x+4 \\ -4 \quad \quad -4 \end{array}$$

$$\frac{8}{4} = \frac{4x}{4}$$

$$\boxed{2 = x} \quad \checkmark$$

Step 3: Check: $x \neq -3$
 $x \neq -4$

$$\boxed{x=2}$$

$$\textcircled{20} \quad \frac{3x}{\cancel{4} \leftarrow} \cdot \frac{\cancel{20}^5}{1} = \frac{15x}{11x} = \boxed{\frac{15}{11}}$$

$$\frac{11x}{\cancel{20} \leftarrow} \cdot \frac{\cancel{20}^1}{1}$$

① LCD: 20

② Multiply num and deno by LCD 20

$$\textcircled{21} \quad \frac{2}{x^2} + \frac{1}{x}$$

$$\frac{4}{x^2} - \frac{1}{x}$$

① LCD: x^2

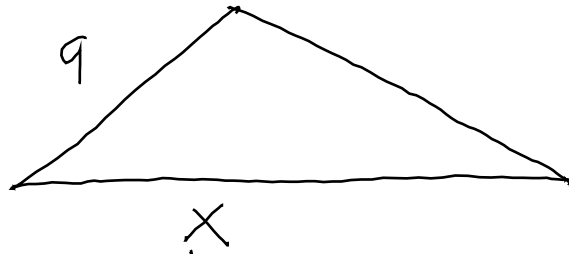
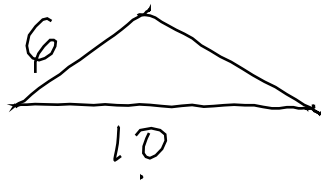
② Multiply each fraction by x^2

$$\textcircled{x^2} \cdot \frac{2}{\cancel{x^2}} + \frac{\cancel{x^2}^1}{x} \cdot \frac{1}{\cancel{x}} = \boxed{\frac{(2+x)}{(4-x)}}$$

$$\frac{\cancel{x^2} \cdot \frac{4}{\cancel{x^2}} - \cancel{x^2} \cdot \frac{1}{\cancel{x}}}{\cancel{x^2} \cdot \frac{4}{\cancel{x^2}} - \cancel{x^2} \cdot \frac{1}{\cancel{x}}}$$

~~22~~

22



$$\frac{6}{9} = \frac{10}{x}$$

$$\frac{6x}{6} = \frac{90}{6}$$

$$x = 15$$

23

$$\frac{1}{11}x + \frac{1}{8}x = 1$$

① LCD: 88

② Multiply every term by LCD,

$$88 \cdot \frac{1}{11}x + 88 \cdot \frac{1}{8}x = 88 \cdot 1$$

$$8x + 11x = 88$$

$$\frac{19x}{19} = \frac{88}{19} = 4 \frac{12}{19} \text{ hours}$$